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09/190,207	11/13/1998	JIASHU CHEN	CHEN-4	6396

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EXAMINER	
NGUYEN, DUC MINH	
ART UNIT	PAPER NUMBER
2643	

DATE MAILED: 07/14/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

Office Action Summary	Application No. 09/190,207	Applicant(s) CHEN, JIASHU	
	Examiner Duc Nguyen	Art Unit 2643	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-12 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-12 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al (5,500,900) in view of Poggio et al.

Consider claim 1. Chen teaches a head-related transfer function model for use (in any event, "**for use**" is not a positive structural limitation) with 3D sound applications, comprising (a) a plurality of Eigen filters (fig 5a, #42 & 43); (b) a plurality of spatial characteristic functions are adaptively combined with said plurality of Eigen filters (fig 5a, #106 & 107); and (c) regularizing model (the spline model, col 5, lines 66 - 67 through col 6, lines 1 -5) adapted to regularize said plurality of spatial characteristic functions (fig 5a, #107 & 108) prior to said respective combination with said plurality of Eigen filters (fig 5a, #51 & 52). The spline method explains that the regularizing is done in the STCF's and FETF's measurements (col 5, lines 18 - 43). Chen also teaches time domain filtering as an alternative (where the basic filters are implemented in the time domain rather than the frequency domain, **the process of convolution is carried out on the input signal and basic filters in impulse response form**; col. 6, ln. 56 to col. 7, ln. 5). Chen further teaches free-field-to-eardrum transfer functions (FETF's), also known as head related transfer functions (HRTF's) (col. 1, ln. 40-50). Chen also teaches that H (ω,θ,Φ) is the measured FETF (i.e., HRTF) at some azimuth θ and elevation Φ, the overall model

response, can be expressed as the equation (1) (col. 4, ln. 11-13; see also col. 3, ln. 56 to col. 7, ln. 5). Chen clearly admits in (col. 6, ln. 56 to col. 7, ln. 5) that in the above example, the filtering of components is performed in the frequency domain, but it should be apparent that equivalent examples could be set up to filter components in the time domain [**Emphasis added**]. Chen further admits in (col. 7, ln. 1-5) that where the basic filters are implemented in the time domain rather then the frequency domain, the process of convolution is carried out on the input signal and the basic filters in impulse response form [**Emphasis added**]. According to Chen's admission, equation (1) can be expressed in time domain transfer function (i.e., the impulse response form if the basic filters has the same form as equation (1) with the spatially variant terms $w_i(\theta,\Phi)$ separated from the time-dependent terms in the impulse response) (col. 6, ln. 56 to col. 7, ln. 5). It would have been obvious to one of ordinary skill in the art that in case equation (1) expressed in time domain or impulse response form as admitted by Chen, all of the remaining equations (e.g., 1' to 7) are also expressed and calculated in impulse response forms. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize and process the teachings of Chen in time domain in order to provide shorter processing time, since implementations and operation in frequency domain transfer functions are often slow (because the use of FFT and IFFT). Moreover, Column(s) 5, line(s) 5-43 clearly shows that the STCF's $w_i(\theta, \Phi)$, i = 1, …, p, are obtained by fitting a spline function over azimuth and elevation variables to STCF samples. Moreover, equations (5), (6), and (7) are computed based on a plurality of variables. In short, the regularizing model of Chen provides a plurality of HRTF's with varying degrees of smoothness.

Poggio teaches the use of a plurality of regularizing models (splines or Generalized Regularization Networks; see the entire abstract; page 224, section 2; page 225, section 3) for the purposes of encompassing an even broader range of approximation schemes, including tensor product splines and many of the general additive models and some of the neural networks (see the last paragraph of section 1, Introduction).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize the teachings of Poggio into the teachings of Chen for the purposes mentioned above.

Consider claim 2. Chen further teaches the head-related transfer function model for use (in any event, "for use" is not a positive structural limitation) with 3D sound applications further comprising a summer (fig 5a, # 80 & 81) operably coupled to the plurality of combined Eigen filters combined with the plurality of regularized spatial characteristic functions to provide the head-related transfer function model (fig 5a, #51 and 52).

Consider claim 3. Chen in view of Poggio further teaches the plurality of regularizing models are each adapted to perform a generalized spline model (col 5, lines 66-67 through col 6, lines 1-5). The spline method explains that the regularizing is done in the STCF's and FETF's measurements (col 5, lines 18-43). Poggio teaches the use of a plurality of regularizing models (splines or Generalized Regularization Networks; see the entire abstract; page 224, section 2; page 225, section 3).

Consider claim 4. Chen further teaches a smoothness control operably coupled with the plurality of regularizing models to allow control of a trade-off between localization and smoothness of the head-related transfer function (col 5, lines 27-43).

Consider claim 5. Chen teaches a head-related impulse response model for use (in any event, "**for use**" is not a positive structural limitation) with 3D sound applications, comprising a plurality of Eigen filters (fig 5a, # 51 & 52); a plurality of spatial characteristic functions are adapted to be respectively combined with the plurality of Eigen filters (fig 5a, #106 & 107); and a plurality of regularizing models adapted to regularize the plurality of spatial characteristic functions (fig 5a, #106 & 107) prior to the respective combination with the plurality of Eigen filters (fig 5a, #51 & 52). (The ref. for this claim is in col 5, lines 29 43). Chen also teaches time domain filtering as an alternative (where the basic filters are implemented in the time domain rather than the frequency domain, **the process of convolution is carried out on the input signal and basic filters in impulse response form**; col. 6, ln. 56 to col. 7, ln. 5). Chen further teaches free-field-to-eardrum transfer functions (FETF's), also known as head related transfer functions (HRTF's) (col. 1, ln. 40-50). Chen also teaches that H (ω,θ,Φ) is the measured FETF (i.e., HRTF) at some azimuth θ and elevation Φ, the overall model response, can be expressed as the equation (1) (col. 4, ln. 11-13; see also col. 3, ln. 56 to col. 7, ln. 5). Chen clearly admits in (col. 6, ln. 56 to col. 7, ln. 5) that in the above example, the filtering of components is performed in the frequency domain, but it should be apparent that equivalent examples could be set up to filter components in the time domain [**Emphasis added**]. Chen further admits in (col. 7, ln. 1-5) that where the basic filters are implemented in the time domain rather then the frequency domain, the process of convolution is carried out on the input signal and the basic filters in impulse response form [**Emphasis added**]. According to Chen's admission, equation (1) can be expressed in time domain transfer function (i.e., the impulse response form if the basic filters has the same form as equation (1) with the spatially variant terms $w_i(\theta,\Phi)$ separated from the time-dependent terms in

the impulse response) (col. 6, ln. 56 to col. 7, ln. 5). It would have been obvious to one of ordinary skill in the art that in case equation (1) expressed in time domain or impulse response form as admitted by Chen, all of the remaining equations (e.g., 1' to 7) are also expressed and calculated in impulse response forms. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize and process the teachings of Chen in time domain in order to provide shorter processing time, since implementations and operation in frequency domain transfer functions are often slow (because the use of FFT and IFFT). Moreover, the regularization HRTF filter produced by summing Eigen filters and regularized spatial characteristics functions is met by the FETF model (step 37 in fig(s). 4). Also see column(s) 6, line(s) 6-15.

Poggio teaches the use of a plurality of regularizing models (splines or Generalized Regularization Networks; see the entire abstract; page 224, section 2; page 225, section 3) for the purposes of encompassing an even broader range of approximation schemes, including tensor product splines and many of the general additive models and some of the neural networks (see the last paragraph of section 1, Introduction).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize the teachings of Poggio into the teachings of Chen for the purposes mentioned above.

Consider claim 6. Chen further teaches the head-related impulse response model for use (in any event, "for use" is not a positive structural limitation) with 3D sound applications further comprising a summer adapted to sum the plurality of combined Eigen filters combined with the

plurality of regularized spatial characteristic functions to provide the head-related impulse response model (fig 5a, # 80 & 81).

Consider claim 7. Chen in view of Poggio further teaches the plurality of regularizing models are each adapted to perform a generalized spline model (col 5, lines 66-67 through col 6, lines 1-5). The spline method explains that the regularizing is done in the STCF's and FETF's measurements (col 5, lines 18-43). Poggio teaches the use of a plurality of regularizing models (splines or Generalized Regularization Networks; see the entire abstract; page 224, section 2; page 225, section 3).

Consider claim 8. Chen further teaches a smoothness control in communication with the plurality of regularizing models to allow control of a trade-off between localization and smoothness of the head-related transfer function (col 5, lines 28-33).

Consider claims 9-12. Chen teaches a method of determining spatial characteristic sets for use (in any event, "**for use**" is not a positive structural limitation) in a head-related transfer function model, comprising constructing a covariance data matrix of a plurality of measured head-related transfer functions (col 4, lines 40-67); performing an Eigen decomposition of the covariance data matrix to provide a plurality of Eigen vectors (col 4, lines 14 - 55); determining at least one principal Eigen vector from the plurality of Eigen vectors (col. 4, ln. 39 to col. 5, ln. 4; col 6, lines 14 - 49); and projecting the measured head-related transfer functions back to the at least one principal Eigen vector to create the spatial characteristic sets (fig. 4, steps 30-35; col 5 & 6, lines 56 - 67 and 1 - 23). Chen teaches use of frequency domain functions, and frequency domain filtering. Chen also teaches time domain filtering as an alternative (where the basic filters are implemented in the time domain rather than the frequency domain, **the process of**

<u>convolution is carried out on the input signal and basic filters in impulse response form</u>; col. 6, ln. 56 to col. 7, ln. 5). Chen further teaches free-field-to-eardrum transfer functions (FETF's), also known as head related transfer functions (HRTF's) (col. 1, ln. 40-50). Chen also teaches that H (ω,θ,Φ) is the measured FETF (i.e., HRTF) at some azimuth θ and elevation Φ, the overall model response, can be expressed as the equation (1) (col. 4, ln. 11-13; see also col. 3, ln. 56 to col. 7, ln. 5). Chen clearly admits in (<u>col. 6, ln. 56 to col. 7, ln. 5</u>) that in the above example, the filtering of components is performed in the frequency domain, but it should be apparent that equivalent examples could be set up to filter components in the time domain [**Emphasis added**]. Chen further admits in (col. 7, ln. 1-5) that where the basic filters are implemented in the time domain rather then the frequency domain, the process of convolution is carried out on the input signal and the basic filters in <u>impulse response form</u> [**Emphasis added**]. According to Chen's admission, equation (1) can be expressed in time domain transfer function (i.e., the impulse response form if the basic filters has the same form as equation (1) with the spatially variant terms $w_i\,(\theta,\Phi)$ separated from the time-dependent terms in the impulse response) (col. 6, ln. 56 to col. 7, ln. 5). It would have been obvious to one of ordinary skill in the art that in case equation (1) expressed in time domain or impulse response form as admitted by Chen, all of the remaining equations (e.g., 1' to 7) are also expressed and calculated in impulse response forms. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize and process the teachings of Chen in time domain in order to provide shorter processing time, since implementations and operation in frequency domain transfer functions are often slow (because the use of FFT and IFFT). Moreover, Column(s) 5, line(s) 5-43 clearly shows that the STCF's $w_i(\theta, \Phi)$, $i = 1, \ldots, p$, are obtained by

fitting a spline function over azimuth and elevation variables to STCF samples. Moreover, equations (5), (6), and (7) are computed based on a plurality of variables. In short, the regularizing model of Chen provides a plurality of HRTF's with varying degrees of smoothness.

Poggio teaches the use of a plurality of regularizing models (splines or Generalized Regularization Networks; see the entire abstract; page 224, section 2; page 225, section 3) for the purposes of encompassing an even broader range of approximation schemes, including tensor product splines and many of the general additive models and some of the neural networks (see the last paragraph of section 1, Introduction).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize the teachings of Poggio into the teachings of Chen for the purposes mentioned above.

Response to Arguments

3. Applicant's arguments filed 4/27/05 have been fully considered but they are not persuasive.

Regarding the Chen reference, applicant states that Chen fails to teach or suggest a plurality of regularizing models to regularize a plurality of spatial characteristic functions and spatial characteristic sets prior to a respective combination with a plurality of Eigen filters to provide a plurality of HRTF's with varying degrees of smoothness. In contrast to applicant's assertions, Column(s) 5, line(s) 5-43 clearly shows that the STCF's $w_i(\theta, \Phi)$, $i = 1, \ldots, p$, are obtained by fitting a spline function over azimuth and elevation variables to STCF samples. Moreover, equations (5), (6), and (7) are computed based on a plurality of variables. In short, the regularizing model of Chen provides a plurality of HRTF's with varying degrees of smoothness.

On page(s) 4, line(s) 13-17 and page(s) 6, line(s) 29-30 and page(s) 7, line(s) 1-4 of applicant's specification disclose "**[A] generalized spline model for regularization for interpolation and smoothing**" and "the regularizing models 212-216 in the disclosed embodiment **performs [A] so-called generalized spline model function**". Furthermore, fig(s). 2 of the pending application is clearly met by fig(s). 4 of Chen. For instance, steps 102-114 of the pending application are corresponding to steps 31-37 of Chen. The mere fact that a given structure is integral does not preclude its consisting of various elements, Nerwin v. Erlicman, 168 USPQ 177, 179 (PTO Bd. Of Int. 1969). However, in order to make the record clear in case this application is sent to the Board of Appeal and Interference, the examiner cited the Poggio et al reference.

Regarding the Chen reference, applicant states that Chen fails to teach a single regularization HRTF filter produced by summing Eigen filters and regularized spatial characteristics functions. In contrast to applicant's assertions, the regularization HRTF filter produced by summing Eigen filters and regularized spatial characteristics functions is met by the FETF model (step 37 in fig(s). 4). Also see column(s) 6, line(s) 6-15.

In response to applicant's argument regarding the term "for use", the MPEP states,"

PREAMBLE STATEMENTS RECITING PUR-POSE OR INTENDED USE

The claim preamble must be read in the context of the entire claim. The determination of whether preamble recitations are structural limitations or mere statements of purpose or use "can be resolved only on review of the entirety of the [record] to gain an understanding of what the inventors actually invented and intended to encompass by the claim." Corning Glass Works, 868 F.2d at 1257, 9 USPQ2d at 1966. If the body of a claim fully and intrinsically sets forth all of the limitations of the claimed invention, and the preamble

merely states, for example, the purpose or intended use of the invention, rather than any distinct definition of any of the claimed invention's limitations, then the preamble is not considered a limitation and is of no significance to claim construction. Pitney Bowes, Inc. v. Hewlett-Packard Co., 182 F.3d 1298, 1305, 51 USPQ2d 1161, 1165 (Fed. Cir. 1999). See also Rowe v. Dror, 112 F.3d 473, 478, 42 USPQ2d 1550, 1553 (Fed. Cir. 1997) ("where a patentee defines a structurally complete invention in the claim body and uses the preamble only to state a purpose or intended use for the invention, the preamble is not a claim limitation"); Kropa v. Robie, 187 F.2d at 152, 88 USPQ2d at 480-81 (preamble is not a limitation where claim is directed to a product and the preamble merely recites a property inherent in an old product defined by the remainder of the claim); STX LLC. v. Brine, 211 F.3d 588, 591, 54 USPQ2d 1347, 1350 (Fed. Cir. 2000) (holding that the preamble phrase "which provides improved playing and handling characteristics" in a claim drawn to a head for a lacrosse stick was not a claim limitation). Compare > Jansen v. Rexall Sundown, Inc., 342 F.3d 1329, 1333-34, 68 USPQ2d 1154, 1158 (Fed. Cir. 2003) (In a claim directed to a method of treating or preventing pernicious anemia in humans by administering a certain vitamin preparation to "a human in need thereof," the court held that the preamble is not merely a statement of effect that may or may not be desired or appreciated, but rather is a statement of the intentional purpose for which the method must be performed. Thus the claim is properly interpreted to mean that the vitamin preparation must be administered to a human with a recognized need to treat or prevent pernicious anemia.);< In re Cruciferous Sprout Litig., 301 F.3d 1343, 1346-48, 64 USPQ2d 1202, 1204-05 (Fed. Cir. 2002) (A claim at issue was directed to

a method of preparing a food rich in glucosinolates wherein cruciferous sprouts are harvested prior to the 2-leaf stage. The court held that the preamble phrase "rich in glucosinolates" helps define the claimed invention, as evidenced by the specification and prosecution history, and thus is a limitation of the claim (although the claim was anticipated by prior art that produced sprouts inherently "rich in glucosinolates").) During examination, statements in the preamble reciting the purpose or intended use of the claimed invention must be evaluated to determine whether the recited purpose or intended use results in a structural difference (or, in the case of process claims, manipulative difference) between the claimed invention and the prior art. If so, the recitation serves to limit the claim. See, e.g., In re Otto, 312 F.2d 937, 938, 136 USPQ 458, 459 (CCPA 1963) (The claims were directed to a core member for hair curlers and a process of making a core member for hair curlers. Court held that the intended use of hair curling was of no significance to the structure and process of making.); In re Sinex, 309 F.2d 488, 492, 135 USPQ 302, 305 (CCPA 1962) (statement of intended use in an apparatus claim did not distinguish over the prior art apparatus). If a prior art structure is capable of performing the intended use as recited in the preamble, then it meets the claim. See, e.g., In re Schreiber, 128 F.3d 1473, 1477, 44 USPQ2d 1429, 1431 (Fed. Cir. 1997) (anticipation rejection affirmed based on Board's factual finding that the reference dispenser (a spout disclosed as useful for purposes such as dispensing oil from an oil can) would be capable of dispensing popcorn in the manner set forth in appellant's claim 1 (a dispensing top for dispensing popcorn in a specified manner)) and cases cited therein. See also MPEP § 2112 - § 2112.02."

Conclusion

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Duc Nguyen whose telephone number is 571-272-7503. The examiner can normally be reached on 7:00AM-3:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Curtis Kuntz can be reached on 571-272-7499 The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Duc Nguyen
Primary Examiner
Art Unit 2643

7/8/05